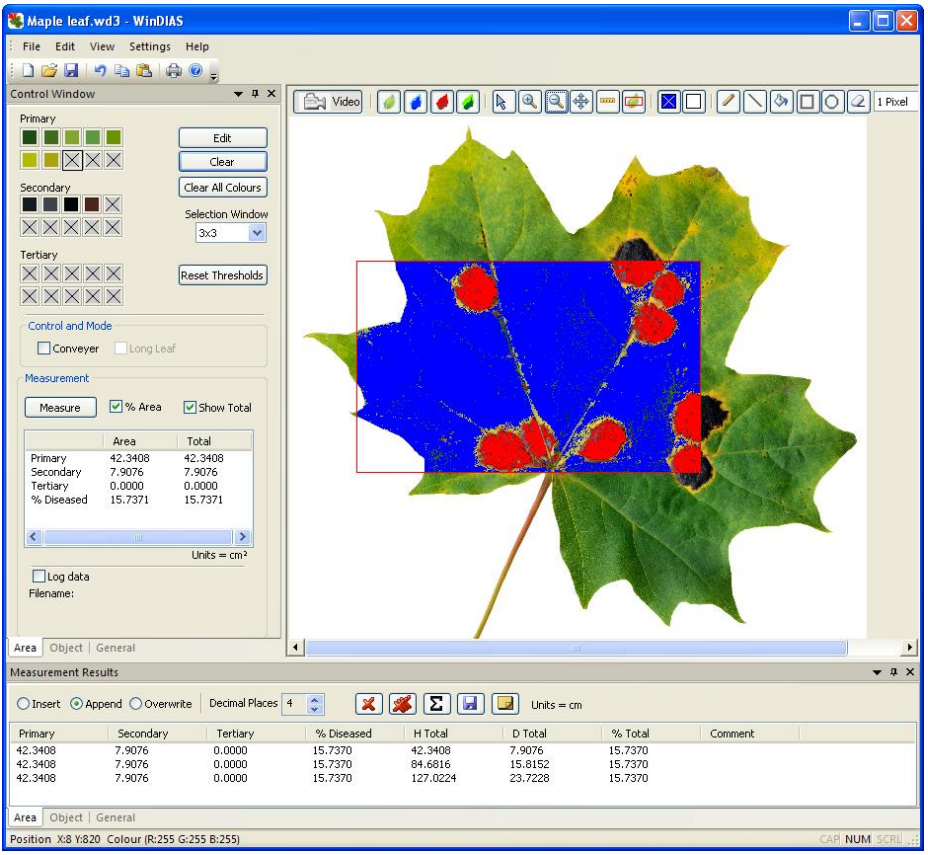
WinDIAS 3

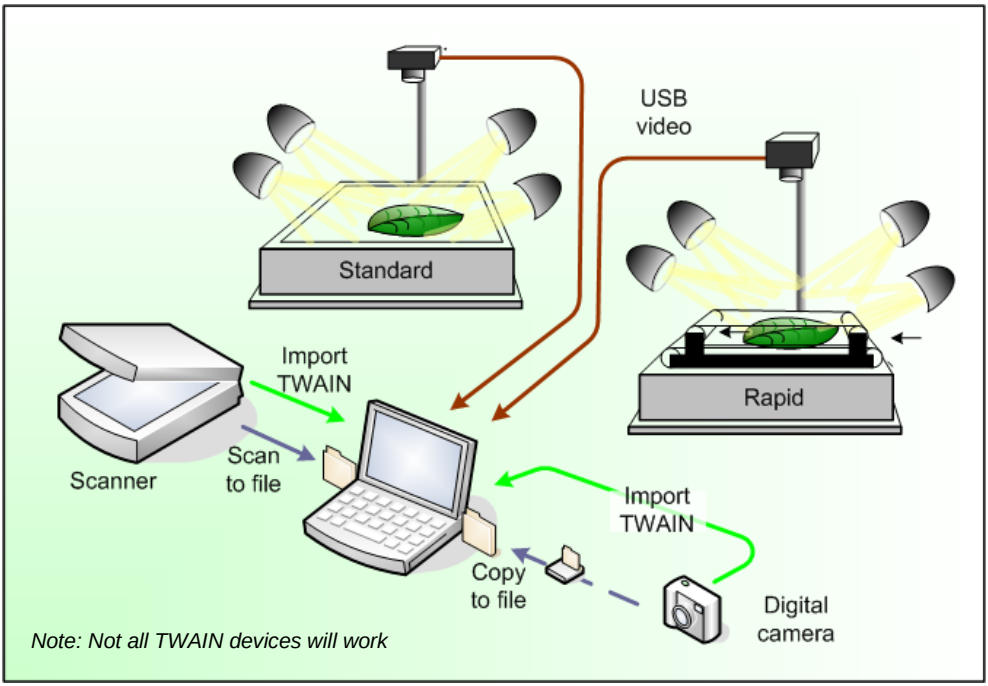
Image Analysis System

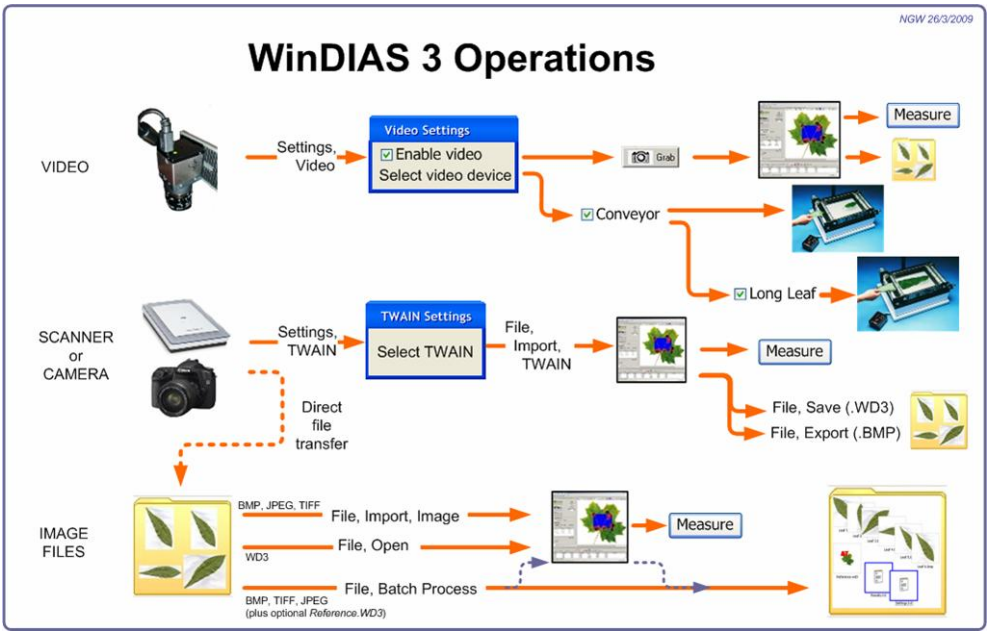
Quick Start Guide *version 3.2*



Delta-T Devices Ltd

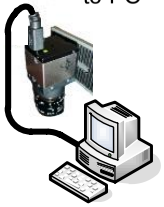
Overview


USB
video
Standard
Rapid
Import
TWAIN
Scanner
Scan
to file
Import
TWAIN
Copy
to file
Digital
camera
Note: Not all TWAIN devices will work


NGW 26/3/2009
WinDIAS 3 Operations
VIDEO
Settings,
Video
Video Settings
Enable video
Select video device
Grab
Measure
Conveyor
Long Leaf
SCANNER
or
CAMERA
Settings,
TWAIN
TWAIN Settings
Select TWAIN
File,
Import,
TWAIN
Measure
File, Save (.WD3)
File, Export (.BMP)
Direct
file
transfer
IMAGE
FILES
BMP, JPEG, TIFF
File, Import, Image
WD3
File, Open
BMP, TIFF, JPEG
(plus optional Reference.WD3)
File, Batch Process
Measure

NGW 15/4/2011

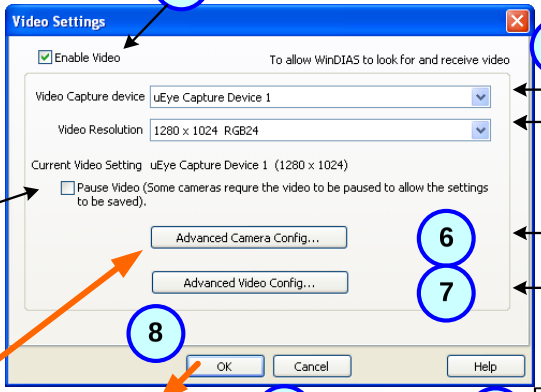
1 Connect camera to PC



2 PC detects camera, and runs camera Install Wizard(s)

3 Run WinDIAS & select **Settings, Video**

4 Enable Video

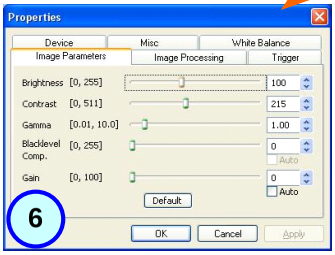

Video Settings
Enable Video
To allow WinDIAS to look for and receive video
Video Capture device
uEye Capture Device 1
Video Resolution
1280 x 1024 RGB24
Current Video Setting uEye Capture Device 1 (1280 x 1024)
Pause Video (Some cameras require the video to be paused to allow the settings to be saved).
Advanced Camera Config...
Advanced Video Config...
OK
Cancel
Help

5 Select camera and resolution

6 Optimise camera settings

7 If using conveyor set shutter speed to about 10 msec to minimise mains flicker

Pause Video to allow IDS uEye camera settings to be saved (within Advanced Camera Settings)



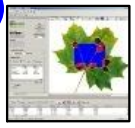
Optimise and save camera settings

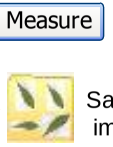
8

Live video

9 Grab Image

10 Pick colours

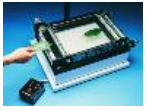




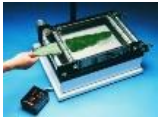
Save image

Live Video

☑ Conveyor

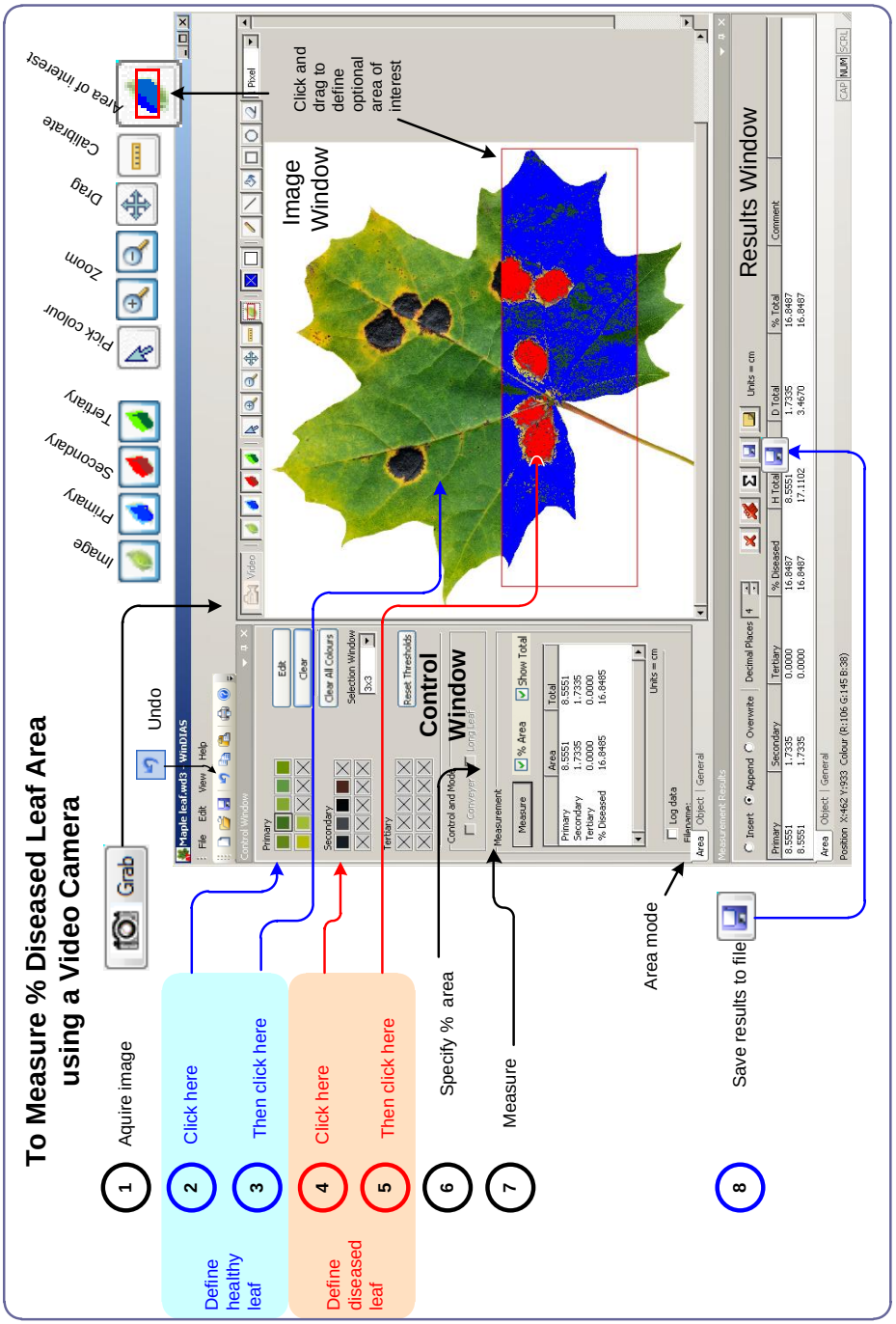


☑ Long Leaf



Video Camera Operations

To Measure % Diseased Leaf Area

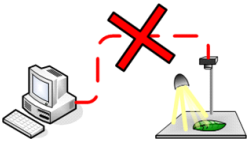


PC Requirements:

- A dual core CPU, either an Intel Core Duo and later, or AMD X2 or later.
- Microsoft Windows XP (SP3), Vista (32 or 64 bit), Windows7 (32 or 64 bit).
- Minimum of 1 USB port for WinDIAS dongle, and 1 for camera or scanner.
- CD ROM drive if installing software from a CD
- Optional: Microsoft Excel for processing saved measurements
- Acrobat Reader for reading documentation.
- IDS uEye video camera driver version 3.8 (if using an IDS uEye camera) provided on WinDIAS 3.2 CD.

Install Software

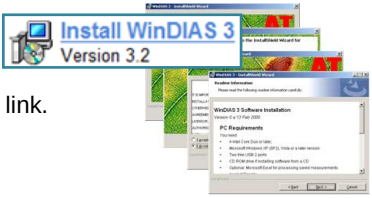
1) Disconnect the Video Camera



2) Insert the CD.

It should auto run and display the CD Menu.
If this does not happen, then, from the **Start** menu, browse to the CD and **Run Setup.exe**.
If running Windows Vista or later, you may be asked to confirm to run Setup.

3) Install WinDIAS



Select the link to the **Installation Guide** and read it.
Then, when you are ready, click the **Install WinDIAS 3** link.

4) Install the Video Camera driver

Refer to the on-screen guidelines and instructions to guide you through installing the USB video camera driver.

5) Connect Video Camera to PC

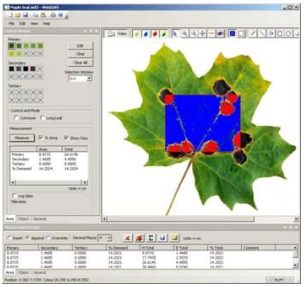
Use the USB cable to connect the camera to the PC.
Windows should auto-detect that a new USB device has attached and integrate with it.
How this process appears depends on your operating system. Windows 7 is really quite slick.
Under XP the hardware detection wizard runs twice.

6) Insert Copy Protection Dongle

Insert the WinDIAS Copy Protection USB dongle.

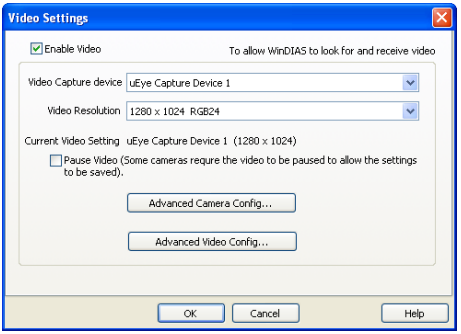
7) Run WinDIAS

On first installation, when **WinDIAS** runs, it loads and displays a maple leaf image.
If using a video camera go to step 6.
If using a scanner, or a still digital camera, go to step 11.



8) Select the Video Camera

- Select **Settings, Video,** and check the **Enable Video** box.
- In the **Video Capture Device** choose your camera from the list offered.
- Click **OK**.
- The video image should now appear. If not, disconnect and reconnect the camera cable.
- Select the highest convenient resolution, (lower it to increase frame rate if too slow in conveyor mode).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Enable Video
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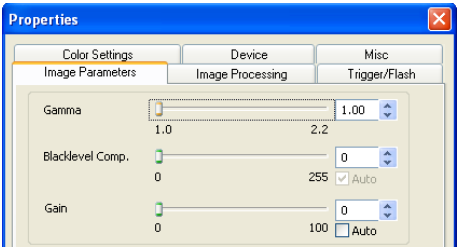
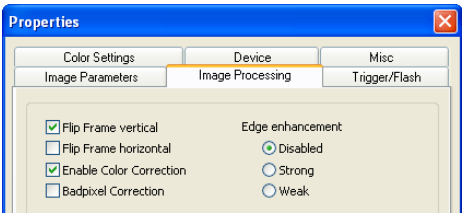
Video Capture device
uEye Capture Device 1
Video Resolution
1280 x 1024 RGB24
Current Video Setting uEye Capture Device 1 (1280 x 1024)
Pause Video (Some cameras require the video to be paused to allow the settings to be saved).
Advanced Camera Config...
Advanced Video Config...
OK
Cancel
Help

9) Configure Camera

- Set the lens aperture and focus.
  In **Settings, Video, Advanced <u>Camera</u> Config, Image parameters:** ensure **Auto Gain** is disabled.
- In **Image Processing**: enable **Colour Correction**.
- In **Color Settings**: you want white to look white, so select a colour temperature which achieves this, or with live video enabled and looking at a white sheet of paper select "**one shot**".
- To change shutter speed select **Settings, Video, Advanced <u>Video</u> Config**.

Note: Other camera brands expose their settings differently.





10) Save Video Camera Settings

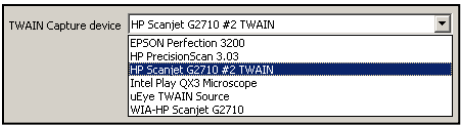
To ensure the IDS camera settings persist from one session to the next select **Settings, Video, and** enable **Pause Video.** Then in **Advanced <u>Camera</u> Config, Device,** select **Save Settings**. Then click **OK**.
Note this option is only available when the video stream is paused.

11) Using a Scanner or Digital Camera

Any BMP, TIFF or JPEG image on your PC may be imported for measurement in WinDIAS using **File, Import Image**.
WinDIAS can also import images directly from many, but not all, scanners and digital cameras having a TWAIN interface driver.

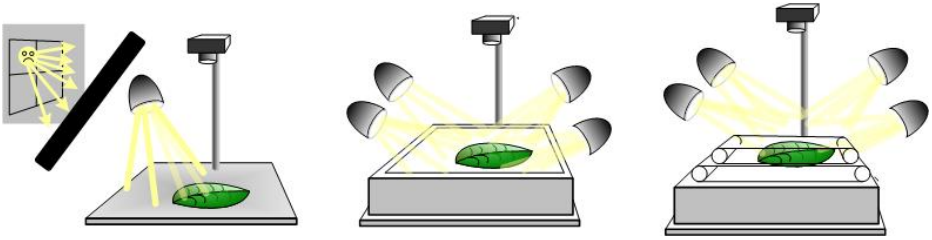
1. Install the scanner or digital camera software on your PC.
2. In the **Settings, TWAIN** window click on the down arrow to see what devices may be available. It is a matter of testing to see if it works.

In this example you can see an HP G2710 scanner exposed more than one driver. The one with the word "TWAIN" in works OK with WinDIAS.



3. Select **File, Import TWAIN** to activate the scanner – it may pause a minute to warm up first.
4. When finished the TWAIN device will pass its image file into WinDIAS.
5. To save an image for batch processing later **ensure the WinDIAS colour picking overlays are turned off,** then select **File, Export** to save in **.BMP** format. See also ***Batch Processing.***

Lighting

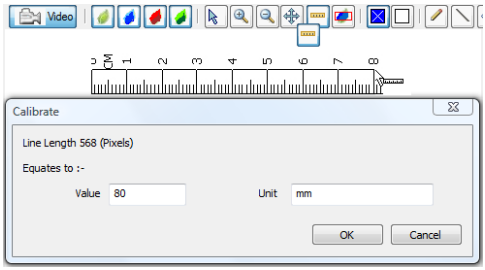


Cover windows and give lights 30 minutes to warm up.
Poorly controlled illumination can dominate the accuracy of your results.
Variations in lighting may also affect the accuracy of leaf images obtained by a flatbed scanner, due to the directional nature of the scanner light source and the finite thickness of, for instance, the ribs and veins in a leaf.
To evaluate the magnitude of this source of variation, scan a particular leaf at different orientations, and Batch Process the data.

How to Calibrate

1. **Grab** an image of a ruler.
2. Click on the **Calibrate** tool.
3. Drag the mouse cursor to draw a line a known distance along the ruler.
4. Enter its **Value** and **Units**.

Note: see below for long leaf calibration.



Batch Processing

Introduction to batch processing

- Batch Processing acts like a “Virtual Conveyor Belt” - quickly processing a large number of image files on your PC.
- It can measure BMP, JPEG or TIFF image file formats.
- It can be set to measure WinDIAS’s area or shape measurement functions.
- You point WinDIAS at a folder full of image files. WinDIAS loads each image in turn, measures it, and saves the results back into the same folder.

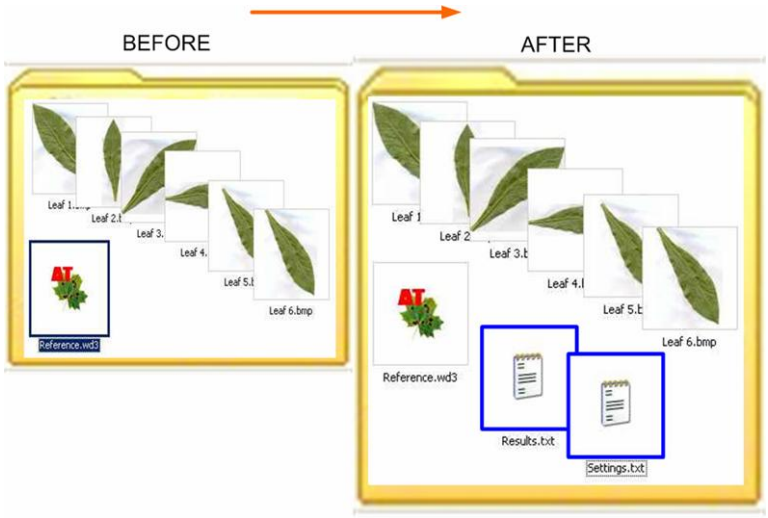


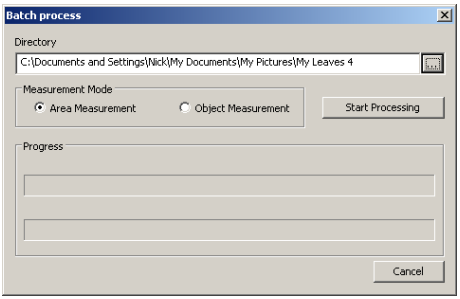
Illustration showing the contents of a folder before and after using the Batch Process command

- If you previously saved a WinDIAS (.wd3 format) image file to this folder with the name “**Reference.wd3**” then WinDIAS will find it and use the settings from that file to process all the other images in that folder.
- If no image file called Reference.wd3 is found in the folder, WinDIAS will use its current threshold settings and magnification.

Warnings:
If no threshold settings have been set, the results will all be zero!
If no magnification is set, the units will be in pixels!

How to Measure using Batch Processing

1. Using **File, Import Image**, load an image file into WinDIAS, calibrate it, and set the detection thresholds by picking colours for the Primary, Secondary or Tertiary regions, whatever you require.
2. Create a test folder for the tests and using **File, Save**, save the image as **Reference.wd3** to this folder.
3. Place all the images files you want processing into this folder.
4. Select File Batch Processing to display the **Batch process** dialog
5. Click on the browse button [...] and select the test folder.
6. Select **Area** or **Object Measurement**. These will measure according to the settings on your Area or Object Control windows in WinDIAS.
7. Click **Start Processing**.
8. Inspect the results as below.



Batch Processing Results

Results are saved to the same folder in a text file called "**Results.txt**" along with a second "**Settings.txt**" file

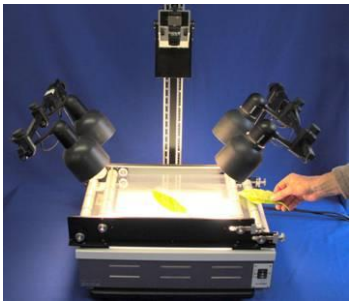
The Results.txt file is formatted as tab-separated values for ease of importing into spreadsheets such as Excel.

The **Settings.txt** file contains the reference file name and path, date and time, and the mid value and range for each of the colour zones picked.

Tip: To extract a record of the colour threshold settings from *any* .wd3 image file, save a copy, naming it "Reference.wd3" to an empty folder and run the batch process command on that folder. A Settings.txt file will be created with the colour threshold settings in.

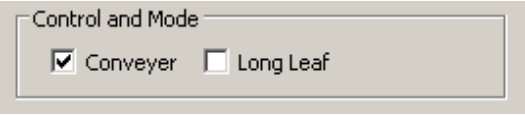
Conveyor Operations

WinDIAS can automatically grab and measure the area of leaves fed individually through the Conveyor, saving both individual readings and running totals.
Leaves too long to be grabbed all at once can be measured using the Long Leaf mode.
Conveyor operations only work with the video cameras, and work best with the global shutter camera supplied with the WinDIAS 3 Rapid System.



How to Measure Leaf Area by Conveyor

1. In **Settings, Video, Advanced Video Config**... set the video camera shutter speed to about 10ms. If the shutter speed is too slow the image blurs and accuracy is lost. If too fast the illumination beats with the mains frequency.
2. In **Settings, Video, Advanced Camera Config...** optimise lens aperture and camera settings.
3. It may be necessary to repeat steps 1& 2 to optimise the image.
4. To save the camera settings select **Settings, Video, Advanced Camera Config...**, **Device, Save Settings** and press OK.
5. **Grab** an image of a stationary ruler and **Calibrate** as described above.
6. **Grab** an image of a stationary leaf and pick healthy and diseased areas.
7. Enable **Conveyor** in the **Area** Control Window



8. Select live **Video.**

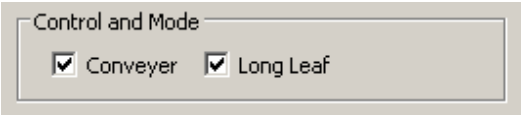
9. Turn on the Conveyor via its own Control Box.
   Note it can go forwards and backwards. When running correctly, each leaf is grabbed once, only when fully in the field of view (or **Area of Interest**, if defined).
10. Feed leaves in and check they are being fully thresholded.
    If necessary, adjust the colour picking thresholds until you are satisfied.
11. Clear any unwanted results using the delete button
12. Enable **Log data** in the **Area** Control Window, and name a results file in the **Save As** dialog.
13. Feed leaves carefully into the conveyor, one at a time.

See also the **online Help** and ***WinDIAS User Manual.***

How to Measure Long Leaves

Use this for leaves which are too long to be grabbed all at once.
The Long Leaf mode requires a leaf of known area for calibration.
Instead of grabbing each whole leaf once, the conveyor constantly measures a narrow vertical strip in the field of view, as the leaf continuously enters, producing a cumulative total proportional to the whole area. This is then scaled according to the known area of the reference leaf, which you have to determine independently.

1. Cut a short section from your long leaf and measure its area as described above in stages 1 to 13 of *How to Measure Leaf Area by Conveyor.*



2. Enable both **Conveyor** and **Long Leaf** modes, and select live **Video**.
3. Feed through your reference leaf again, and enter its known area when asked.
4. The long leaf mode is now calibrated.
5. Feed leaves carefully into the conveyor, one at a time**.**

Conveyor Operation Summary

Operation

- Place the Conveyor on top of the light box.
- Avoid bright ambient light and sunlight.
- Adjust the belt tension – see Belt Tension Adjustment.
- Slide guide rods into position.
- Run WinDIAS software, and optimise camera, lens and threshold.
- Click on the **Calibrate** tool and calibrate with ruler.
- Toggle **Conveyor** on in the **Area** Control Window.

SLACKEN THE BELTS AT FINISH

Belt Speed Selection

- Choose the fastest speed that does not blur the image.
- Set the camera shutter to around 1-10 ms.
- The image should take about two seconds to cross the screen.
- Drop the idlers pulley in its slot to release the drive band tension.
- Remove the knurled nut from the motor shaft.
- Fit the desired pulley and lock it in place.
- Re-tension the drive band to eliminate slip. Do not over-tighten.
- Keep all liquids away from the drive band and pulleys.

Belt Removal

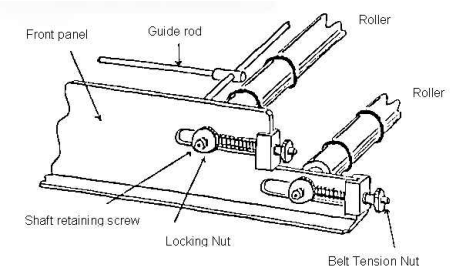
De-tension the belts.
Remove the line-guides.
Unlock and release the roller shafts.
Lift out each belt and its pair of rollers.
On re-assembly, locate the bottom roller inside the rubber drive band.

Belt Renewal and Cleaning

- Cut the new material to length - top belt: 80 cm, bottom belt:104 cm.
- Make a butt-joint using clear adhesive tape on both sides.
- Clean the belts with anti-static spray or a damp soft cloth.
- Avoid abrasive cleaners and solvents.

Belt Tension Adjustment

The upper and lower conveyor belts are tensioned with four belt-tensioning nuts.
Initially the belt tension should be minimal.
Ensure that the tension is even and that the belts are centred.
Inspect the belts for ripples - this indicates uneven or excessive tension.



SLACKEN THE BELTS AT FINISH

Sources of information

- WinDIAS 3 ***On Line Help***

Documents installed on your Desktop along with WinDIAS 3

- ***WinDIAS 3 User Manual***
- ***uEye Camera User Manual***
- ***WinDIAS 3.2 Quick Start Guide*** (this document)

Service, Repairs and Spares

Users in countries that have a Delta-T distributor or technical representative should contact them in the first instance.

Spare parts for our own instruments can be supplied and can normally be despatched within a few working days of receiving an order.

Spare parts and accessories for products not manufactured by Delta-T may have to be obtained from our supplier, and a certain amount of additional delay is inevitable.

No goods or equipment should be returned to Delta-T without first obtaining the return authorisation from Delta-T or our distributor.

On receipt of the goods at Delta-T you will be given a reference number. Always refer to this reference number in any subsequent correspondence. The goods will be inspected and you will be informed of the likely cost and delay.

We normally expect to complete repairs within one or two weeks of receiving the equipment. However, if the equipment has to be forwarded to our original supplier for specialist repairs or recalibration, additional delays of a few weeks may be expected. For contact details see below.

Technical Support

Users in countries that have a Delta-T distributor or technical representative should contact them in the first instance.

Technical Support is available on Delta-T products and systems. Your initial enquiry will be acknowledged immediately with a reference number. Make sure to quote the reference number subsequently so that we can easily trace any earlier correspondence.

In your enquiry, always quote instrument serial numbers, software version numbers, and the approximate date and source of purchase where these are relevant.

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Cambridge CB25 0EJ
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Fax: +44 1638 743155
e-mail: sales@delta-t.co.uk
web: www.delta-t.co.uk